Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (currently amended) A method for determining the effectiveness of a catalyst having both first, relatively high oxidizable material provided to remove emissions from the exhaust of an internal combustion engine and a second, relatively low oxidizable material provided to remove emissions from such exhaust, such method comprising:

measuring an upstream time history of a signal produced by an exhaust gas oxygen sensor upstream of the converter and a time history of an exhaust gas oxygen sensor disposed downstream of the converter, such time histories having first transitions when the time history varies ~~varying~~ between a lean air-fuel ratio signal level and a rich air-fuel ratio signal level and having second transitions when th etime history varies between a rich air-fuel ratio signal level and a lean air-fuel ratio signal level;

determining a time delay between only the first transitions in the upstream time history and the downstream time history ~~during transitions in such time histories from the lean air-fuel ratio signal level to the rich air-fuel ratio signal level~~;

comparing the determined time delay with a reference time delay to determine the efficiency of the converter;

determining the effectiveness of the converter from such comparison.

2. (currently amended) The method recited in claim 1 wherein ~~the~~ a predetermined value is between two operating stoichiometric ratios.

3. (original)The method recited in claim 2 wherein the converter includes an oxidizable material and a precious metal material.

4. (currently amended) A method for determining the effectiveness of a catalyst having both first, relatively high oxidizable material provided to remove emissions from the exhaust of an internal combustion engine and a second, relatively low oxidizable material provided to remove emissions from such exhaust, such method comprising:

generating a first signal indicative of an exhaust gas air fuel ratio relative to stoichiometry upstream of the converter, such first signal having first transitions when the first signal varies between a lean air-fuel ratio signal level and a rich air-fuel ratio signal level and having second transitions when the first signal varies between a rich air-fuel ratio signal level and a lean air-fuel ratio signal level;~~;~~

generating a second signal indicative of an exhaust gas air fuel ratio relative to stoichiometry downstream of the converter, such second signal having a first transition when the second signal varies between a lean air-fuel ratio signal level and a rich air-fuel ratio signal level and second transition when the second signal varies between a rich air-fuel ratio signal level and a lean air-fuel ratio signal level;

determining a first time when the first signal has a first transitions from a lean to rich air fuel ratio relative stoichiometry;

determining a second time when the second signal has a first transitions from a lean to rich air fuel ratio relative stoichiometry;

determining a catalyst operating efficiency based on the difference between the first and second times, such determining being independent of a time delay between the second transition of the first signal and the second transition of the second signal.~~,~~

5. (original)The method recited in claim 4 wherein the converter includes an oxidizable material and a precious metal material.

6. (new) A method for determining the effectiveness of a catalyst having both first, relatively high oxidizable material provided to remove emissions from the exhaust of an internal combustion engine and a second, relatively low oxidizable material provided to remove emissions from such exhaust, such method comprising:

measuring an upstream time history of a signal produced by an exhaust gas oxygen

sensor upstream of the converter and a time history of an exhaust gas oxygen sensor disposed downstream of the converter, such time histories having first transitions when such time history varies between a lean air-fuel ratio signal level and a rich air-fuel ratio signal level and second transitions when such time history varies between a rich air-fuel ratio signal level and a lean air-fuel ratio signal level;

determining a time delay between the upstream time history and the downstream time history during the first;

comparing the determined time delay with a reference time delay to determine the efficiency of the converter;

determining the effectiveness of the converter from such comparison independent of the second transitions.

7. (new) A system for determining the effectiveness of a catalyst having both first, relatively high oxidizable material provided to remove emissions from the exhaust of an internal combustion engine and a second, relatively low oxidizable material provided to remove emissions from such exhaust, such system comprising:

a first sensor for generating a first signal indicative of an exhaust gas air fuel ratio relative to stoichiometry upstream of the converter, such first signal having first transitions when the first signal varies between a lean air-fuel ratio signal level and a rich air-fuel ratio signal level and having second transitions when the first signal varies between a rich air-fuel ratio signal level and a lean air-fuel ratio signal level;

a second sensor for generating a second signal indicative of an exhaust gas air fuel ratio relative to stoichiometry downstream of the converter, such second signal having a first transition when the second signal varies between a lean air-fuel ratio signal level and a rich air-fuel ratio signal level and second transition when the second signal varies between a rich air-fuel ratio signal level and a lean air-fuel ratio signal level;

a processors for determining a first time when the first signal has a first transitions from a lean to rich air fuel ratio relative stoichiometry, for determining a second time when the second signal has a first transitions from a lean to rich air fuel ratio relative stoichiometry and for determining a catalyst operating efficiency based on the difference between the first

and second times, such determining being independent of a time delay between the second transition of the first signal and the second transition of the second signal.